

CLAIMS

1. A headlamp design based on total concealment of the light source and all the direct and indirect reflecting surfaces and on an exact adjustment of the height of the light plane using a half-lens illumination principle, which provides a continuous long-distance illumination without causing any glaring effects on the eyes of oncoming traffic users.
2. A headlamp design having a triple light pathway and operating with the principle defined in claim 1, comprising a standard light source, a reflector group consisting of three units, three flat mirrors, two mirror-reflectors, an inclined shield, three semi-shutters, three aspherical plano-convex lenses, three light pathways, a transparent front lens, and a headlamp housing.
3. The headlamp according to claim 2, wherein the light source may be incandescent, halogen, high intensity discharge (HID), light emitting diode (LED), fluorescent and other types, without any limitations.
4. The headlamp according to claim 2, wherein the first reflector unit looks forward, the second looks downward and the third looks upward with regard to the travel direction, each unit operating as an independent light pathway according to the same principle using a single light source.
5. The headlamp according to claim 2, wherein the said light source is disposed near the first focal point of each sections of said reflector group.
6. The headlamp according to claim 4, wherein the reflector units are elliptic or combined elliptic form.
7. The headlamp according to claim 4, wherein the reflectors may be parabolic, cylindrical, ellipsoid or similar shapes, or combinations of any of these types, with preferably plurality surface form. The curvature of the said reflector surfaces may be adjusted freely, depending on need or preference.
8. The headlamp according to claim 4, wherein the forward-looking part is comprised of a light source, a reflector unit consisting of upper and lower sections, a inclined shield having a reflective inner surface, a flat or concave reflective surface, a flat mirror, a semi-shutter, a plano-convex lens, and an opening for light passage.
9. The headlamp according to claim 8, wherein the light source is disposed near the first focal point of each reflector sections and has the same types as given in claim 3.

10. The headlamp according to claim 8, wherein the said reflector sections has the same structure as given in claims 6 and 7.
11. The headlamp according to claim 8, wherein the second focal points of said reflector sections are located on the middle section of the upper edge of said inclined shield.
12. The headlamp according to claim 8, wherein the focal point of said plano-convex lens is also located near the middle section of the upper edge of said inclined shield. The said middle section of the upper edge of the shield remains on the horizontal plane, which is parallel to the road surface and passes from the optical center of the plano-convex lens, therefore the light rays focused at this point fall on the lower half of the plano-convex lens and are projected as a parallel light beam towards the road surface for long-distance illumination.
13. The headlamp according to claim 8, wherein a shield with inner flat or concave reflective surface, disposed against said lower reflector section at an angle of approximately 45 degrees, and, when it is in closed position, reflects the light rays falling onto itself to the said reflective surface. When said shield is in open position, it allows the light rays generated by the light source and reflected by lower reflector to fall on the lower half of the plano-convex lens.
14. The headlamp according to claim 8, wherein the said reflective surface may be flat or concave and is disposed at the front edge of upper reflector section, used to direct the light rays falling from said shield onto itself to the lower half of the plano-convex lens.
15. The headlamp according to claim 8, wherein a flat mirror is disposed between the front edge of the reflective surface according to claim 14, and the upper edge of the semi-shutter to reflect the light rays falling onto itself to the lower half of the plano-convex lens.
16. The headlamp according to claim 8, wherein the semi-shutter is a movable piece, and has a reflective flat inner and concave outer surfaces and is disposed between the said flat mirror and the frame of the plano-convex lens. The lower edge of said semi-shutter divides the plano-convex lens into two equal lower and upper parts, and is fixed to the lens frame from its lower edge. When said semi-shutter in closed position, it reflects the light rays falling onto itself to the lower half of the plano-convex lens. When said semi-shutter is in open position, it remains on the horizontal plane, allows the light rays to fall upon the upper half of the plano-

convex lens and directs the light rays falling onto its concave outer surface to the upper half of plano-convex lens and projects them towards the road surface.

17. The headlamp according to claim 8, wherein the plano-convex lens preferably has a flat back surface and an aspherical front surface or it may be of spherical, cylindrical shape or a combination thereof, or a Fresnel lens or any other type, depending on the shape and the size of the headlamp housing depending on purpose.
18. The headlamp according to claim 8, wherein the opening for the light passage that is located between the upper edge of the shield and the lower edge of the semi-shutter is painted with a non-reflective paint or a coating in order to increase the visibility.
19. The headlamp according to claim 4, wherein the downward-looking part is comprised of a light source, a reflector unit consisting of front and rear sections, a mirror-reflector, a flat mirror, a semi-shutter, a plano-convex lens, and an opening for light passage.
20. The headlamp according to claim 19, wherein the light source is disposed near the first focal point of each reflector section and with same the forms as given in claim 3.
21. The headlamp according to claim 19, wherein the said reflector sections have the same structure as given in claims 6 and 7.
22. The headlamp according to claim 19, wherein the second focal point of front reflector section is located near the lower front edge of the said mirror-reflector, which remains on and above the horizontal axis that is parallel to the road surface and passes from the optical center of the plano-convex lens, and therefore all the light rays focused at this point fall on the lower half of the plano-convex lens and are projected as a parallel light beam towards the road surface for long-distance illumination. The second focal point of the rear reflector section is normally behind the said mirror-reflector, but the focal image of the said focal point is shifted to a point between said mirror-reflector and the plano-convex lens so that the light rays passing this focal image fall on the lower half of the said plano-convex lens and are projected as an inclined light beam towards the road surface for short-distance illumination.

23. The headlamp according to claim 19, wherein the focal point of said plano-convex lens is located at the same focal point at the lower front edge of the said mirror-reflector.
- 5 24. The headlamp according to claim 19, wherein the mirror-reflector is disposed at the lower edge of the rear reflector section, so that it can receive all the light rays reflected by both reflector sections and direct them to the lower half of the said plano-convex lens.
- 10 25. The headlamp according to claim 19, wherein the flat mirror is disposed at the lower edge of said front reflector section, so that it directs the light rays falling onto itself to the lower half of the plano-convex lens.
26. The headlamp according to claim 19, wherein the movable semi-shutter has the same shape, design and functions as given in claim 16.
27. The headlamp according to claim 19, wherein the plano-convex has the same shape, design and functions as given in claim 17.
- 15 28. The headlamp according to claim 19, wherein the opening of the light passage is painted with a non-reflective paint or a coating in order to increase the visibility.
- 20 29. The headlamp according to claim 19, wherein the reflector sections are disposed at an inclined position, so that the focal points of front and reflector sections are at the same common focal point, which is located near the lower edge of the mirror-reflector and which is also the focal point of the plano-convex lens, thus all the light rays reflected by the reflector sections are directed towards lower half of the plano-convex lens. Therefore said light rays are projected as a parallel light beam towards the road surface, always remaining under the horizontal plane passing from the optical center of the plano-convex lens.
- 25 30. The headlamp according to claim 4, wherein the upward-looking part is comprised of a light source, a reflector unit consisting of front and rear sections, a mirror-reflector, a flat mirror, a semi-shutter, a plano-convex lens, and an opening for light passage.
- 30 31. The headlamp according to claim 30, wherein the light source is disposed near the first focal point of each reflector section and is of the same types as given in claim 3.
32. The headlamp according to claim 30, wherein the said reflector sections has the same structure as given in claims 6 and 7.

33. The headlamp according to claim 30, wherein the second focal points of front and rear reflector sections are normally located behind the said mirror-reflector, but the focal image of the front reflector section is shifted to the upper edge of the said front reflector section, which remains on the horizontal plane that is parallel to the road surface and that passes from the optical center of the plano-convex lens and the lower edge of the mirror-reflector, and therefore all the light rays focused at this point fall on the lower half of the plano-convex lens and are projected as a parallel light beam towards the road surface for long-distance illumination. The focal image of the rear reflector section is shifted to a point between the upper edge of said front reflector and the plano-convex lens so that the light rays passing this focal image fall on the lower half of the said plano-convex lens and are projected as an inclined light beam towards the road surface for short-distance illumination.
34. The headlamp according to claim 30, wherein the focal point of said plano-convex lens is located at the upper edge of the said front reflector section, which is also the focal image of the second focus of the front reflector section.
35. The headlamp according to claim 30, wherein the mirror-reflector is disposed at the upper edge of the rear reflector section, so that it can receive all the light rays reflected by both reflector sections and direct them towards the plano-convex lens.
36. The headlamp according to claim 30, wherein the flat mirror is disposed at the front edge of said mirror-reflector so that it directs the light rays falling onto itself to the lower half of the plano-convex lens.
37. The headlamp according to claim 30, wherein the movable semi-shutter has the same shape, design and functions as given in claim 16.
38. The headlamp according to claim 30, wherein the plano-convex has the same shape, design and functions as given in claims 17 and 18.
39. The headlamp according to claim 30, wherein the opening of the light passage is painted with a non-reflective paint or a coating in order to increase the visibility.
40. The headlamp according to claim 30, wherein the reflector sections are disposed at an inclined position, so that the focal points of front and reflector sections are at the same common focal point, which is located near the upper edge of the front reflector section and also the focal point of the plano-convex lens, thus all the light rays reflected by the reflector sections are directed towards lower half of the

plano-convex lens. Therefore said light rays are projected as a parallel light beam towards the road surface, always remaining under the horizontal plane passing from the optical center of the plano-convex lens.

- 5 41. The headlamp according to claim 8, wherein the headlamp has a separate light source for itself with the same parts defined in claim 8 and can be used as a separate embodiment with a single light pathway with the same principle of operation.
- 10 42. The headlamp according to claim 19, wherein the headlamp has a separate light source for itself with the same parts defined in claim 19 and can be used as a separate embodiment with a single light pathway with the same principle of operation.
- 15 43. The headlamp according to claim 30, wherein the headlamp has a separate light source for itself with the same parts defined in claim 30 and can be used as a separate embodiment with a single light pathway with the same principle of operation.
44. The headlamp according to claim 41, 42 and 43, wherein the plano-convex may be placed between the reflector and the mirror-reflector, using one or more mirror-reflector within this design.
- 20 45. The headlamp according to claims 19 and 30, wherein the semi-shutter may be used as a fixed part as an extension of the said flat mirror, acting as a single flat reflecting surface, in which case the upper section of the plano-convex lens always remains non-illuminated.
- 25 46. A headlamp design having a triple light pathway and operating with the principle defined in claim 1 comprising a standard light source, a reflector group consisting of three units, three flat mirrors, two mirror-reflectors, a semi-shutter, two aspherical plano-convex lenses, three light pathways, a plano-convex front lens, and a headlamp housing.
47. The headlamp according to claim 46, wherein the light source is as given in claim 3.
- 30 48. The headlamp according to claim 46, wherein the first reflector unit looks forward, the second looks downward and the third looks upward with regard to the travel direction, each unit operating as an independent light pathway according to the same principle using a common single light source.

49. The headlamp according to claim 48, wherein the said light source is disposed near the first focal point of each units of said reflector group.
50. The headlamp according to claim 48, wherein the forward-looking part is comprised of a light source, a reflector consisting of upper and lower sections, a flat mirror, a semi-shutter, a plano-convex lens, and an opening for light passage.
51. The headlamp according to claim 50, wherein the light source is disposed near the first focal point of each reflector sections and is of the same types as given in claim 3.
52. The headlamp according to claim 50, wherein the said reflector sections have the same structure as given in claims 6 and 7.
53. The headlamp according to claim 50, wherein the second focal point of the lower reflector section is located near the front edge of said lower reflector section, which is also the focal point of the plano-convex lens and remains on the horizontal plane that is parallel to the road surface and passes from the optical center of the plano-convex lens, therefore all the light rays focused at this focal point fall on the lower half of the plano-convex lens and are projected as a parallel light beam towards the road surface for long-distance illumination. The second focal point of the upper reflector section is located somewhere between the front edge of said lower reflector section and the plano-convex lens, and therefore the light rays passing from this point fall on the lower half of said plano-convex lens and are projected as an inclined light beam towards the road surface for short-distance illumination.
54. The headlamp according to claim 50, wherein the focal point of said plano-convex lens is also located at the front edge of said lower reflector section.
55. The headlamp according to claim 50, wherein the flat mirror is disposed between the front edge of the upper reflector section and the upper edge of the semi-shutter to reflect the light rays falling onto itself to the lower half of the plano-convex lens.
56. The headlamp according to claim 50, wherein the semi-shutter has a flat reflecting inner surface and a concave outer surface, and is disposed between the said flat mirror and the frame enclosing the lens. The lower edge of said semi-shutter divides the plano-convex lens into two halves, and has the same properties and mechanism as given in claim 16. When said semi-shutter is in open position, the

light rays reflected by the upper reflector section fall on the outer concave surface of the semi-shutter and they are then directed to the upper half of said plano-convex lens, and projected towards the road surface.

- 5 57. The headlamp according to claim 50, wherein the plano-convex lens has the same form as given in claims 17 and 18.
58. The headlamp according to claim 48, wherein the downward-looking part is comprised of a light source, a reflector unit consisting of front and rear sections, a plano-convex lens, a mirror-reflector, a flat mirror, a semi-shutter and an opening for light passage.
- 10 59. The headlamp according to claim 58, wherein the light source is disposed near the first focal point of each reflector section and is of same types as given in claim 3.
60. The headlamp according to claim 58, wherein the said reflector sections are elliptic or combined elliptic form.
- 15 61. The headlamp according to claim 58, wherein the second focal points of front and rear reflector sections are located at a common point near the lower edge of the mirror-reflector, which is also the focal point of said plano-convex lens, and therefore the light rays focused at this common focal point are directed towards the lower half of the plano-convex lens and projected towards the road surface as a parallel light beam.
- 20 62. The headlamp according to claim 58, wherein a mirror-reflector is disposed at the lower edge of the rear reflector section at an appropriate angle.
63. The headlamp according to claim 62, wherein said mirror-reflector is of a parabolic, cylindrical in form or any combination thereof, or it may be a flat reflecting surface.
- 25 64. The headlamp according to claim 58, wherein the flat mirror is disposed at the upper edge of the semi-shutter so that it directs the lights falling onto itself towards the lower half of the plano-convex lens.
65. The headlamp according to claim 58, wherein the semi-shutter has the same properties and mechanism as given in claim 16.
- 30 66. The headlamp according to claim 58, wherein the plano-convex lens has the same form and functions as in claims 17 and 18.
67. The headlamp according to claim 58, wherein the opening of the light passage has the same properties as in claim 28.

68. The headlamp according to claim 48, wherein the upward-looking part is comprised of a light source, a reflector unit consisting of front and rear sections, a mirror-reflector, a flat mirror, a semi-shutter and an opening for light passage.
- 5 69. The headlamp according to claim 68, wherein the light source is disposed near the first focal point of each reflector sections and is of the same types as given in claim 3.
70. The headlamp according to claim 68, wherein the said reflector sections are elliptic or combined elliptic form.
- 10 71. The headlamp according to claim 70, wherein the second focal points of front and rear reflector sections are normally located at a common point behind the mirror-reflector but it is shifted on the upper edge of the front reflector section, which is also the focal point of said plano-convex lens; therefore the light rays focused at this common focal point are directed towards the lower half of the plano-convex
15 lens and projected towards the road surface as a parallel light beam.
72. The headlamp according to claim 68, wherein the mirror-reflector is cylindrical, parabolic or combined form, or it may be a flat reflecting surface.
73. The headlamp according to claim 68, wherein the mirror-reflector is disposed at the upper edge of the rear reflector section so that it can receive all the light rays
20 reflected by both reflector sections and direct them to the common focal point as defined in claim 71 with the same illumination result.
74. The headlamp according to claim 68, wherein the flat mirror is disposed between the front edge of said mirror-reflector and the upper edge of the semi-shutter so that, together with semi-shutter, it acts as a covering shutter for mirror reflector
25 preventing it from being seen by the opposite traffic, and it directs the lights falling onto itself towards the lower half of the plano-convex lens.
75. The headlamp according to claim 68, wherein the opening of the light passage is as given in claim 39.
76. The headlamp according to claim 50, wherein the headlamp has a separate light
30 source for itself with the same parts defined as in claim 50 and can be used as a separate embodiment with a single light pathway with the same principle of operation.
77. The headlamp according to claim 58, wherein the headlamp has a separate light source for itself with the same parts defined as in claim 58 and can be used as a

separate embodiment with a single light pathway with the same principle of operation.

- 5 78. The headlamp according to claim 68, wherein the headlamp has a separate light source for itself with the same parts defined as in claim 68 and can be used as a separate embodiment with a single light pathway with the same principle of operation.
79. The headlamp according to claim 41, 42 and 43, wherein the plano-convex may be placed between the reflector and the mirror-reflector, using one or more mirror-reflector within this design.
- 10 80. The headlamp according to claims 58 and 68, wherein the semi-shutter may be used as a fixed part as an extension of the said flat mirror, acting as a single flat reflecting surface, in which case the upper section of the plano-convex lens always remains non-illuminated.
- 15 81. The headlamp according to claims 41, 42, 43, 44, 76, 77, 78 and 79, wherein the embodiments can be used in double reflector groups with double light pathways, or in triple reflector groups with triple light pathways, or in quadruple reflector groups with quadruple light pathways,
- 20 82. The headlamps given in the claims 2, 8, 19, 30, 41, 42, 43, 44, 46, 50, 58, 68, 76, 77, 78, 79, 81 wherein the headlamp may be movable upwards and downwards, or towards the right and left depending on the travel direction of the vehicle in order to adjust the illumination plane as desired according to road situation.
- 25 83. The headlamp according to claims 8 and 50, the forward-looking reflector can be disposed forward and backward or at inclined positions operating according to the indirect illumination principle with one or two mirror-reflectors disposed against the reflector sections.
- 30 84. The headlamp according to claims 2, 8, 19, 30, 41, 42, 43, 44, 46, 50, 58, 68, 76, 77, 78, 79, 81 but without a plano-convex lens, wherein the alignment of the illumination plane is obtained by adjusting direct and indirect reflective surfaces and the upper edge of the opening on the same horizontal plane that is parallel to the road surface, ensuring that all the light beams remain under the horizontal plane without causing any glaring effects. In such a case, light distribution pattern is ensured by the principal surface that directs the light beam towards the road surface.